

FORM PTO-1390 (REV. 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER PVMT1	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 09/889994	
INTERNATIONAL APPLICATION NO. PCT/FR99/03265		INTERNATIONAL FILING DATE 23 December 1999		PRIORITY DATE CLAIMED 2 February 1999	
TITLE OF INVENTION MODULAR MACHINE FOR STERILIZING CLOSURE PARTS OF BOTTLES WITH SPIRAL PATH					
APPLICANT(S) FOR DO/EO/US CERVENY, Jean-Paul					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input checked="" type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: Drawings (4 sheets) Abstract Verified Statement Express Mail Transmittal Postcard Receipt</p>					

JC17 Rec'd PCT/PTO 25 JUL 2001

U.S. APPLICATION NO. (PCT/FR) 09/889994		INTERNATIONAL APPLICATION NO. PCT/FR99/03265		ATTORNEY'S DOCKET NUMBER PVMT1	
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21. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS PTO USE ONLY	
				\$	860.00
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	29 - 20 =	9	x \$18.00	\$	162.00
Independent claims	1 - 3 =	0	x \$80.00	\$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				\$	
				\$	
TOTAL OF ABOVE CALCULATIONS =				\$	1,022.00
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$	511.00
SUBTOTAL =				\$	511.00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$	511.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$	
TOTAL FEES ENCLOSED =				\$	511.00
				Amount to be refunded:	\$
				charged:	\$

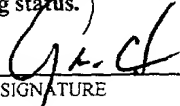
a. ☒ A check in the amount of \$ 511.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
 overpayment to Deposit Account No. 03-2405. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card
 information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR
 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO: COHEN, Gary M., Esq. Strafford Building Number Three 125 Strafford Avenue, Suite 300 Wayne, PA 19087-3318 United States of America Telephone: (610) 975-4430 Facsimile: (610) 975-4436	 SIGNATURE COHEN, Gary M., Esq. NAME <u>28,834</u> REGISTRATION NUMBER
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Express Mail No. ET069433530S

Applicant: CERVENY, Jean-Paul
Application No.: (not yet known)
Filed: July 25, 2001
For: MODULAR MACHINE FOR STERILIZING CLOSURE
PARTS OF BOTTLES WITH SPIRAL PATH

Attorney's Ref.: PVMT1

STATEMENT CLAIMING SMALL ENTITY STATUS
(37 C.F.R. §1.9(f) and §1.27(c)) - SMALL BUSINESS CONCERN

I hereby state that I am

- ☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN: Perrier Vittel Management et Technologie
ADDRESS OF SMALL BUSINESS CONCERN: 20 rue Rouget de Lisle
F-92130 Issy les Moulineaux, France

I hereby state that the above-identified small business concern qualifies as a small business concern as defined in 13 C.F.R. Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, S.W., Washington, D.C. 20416.

I hereby state that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith, with title as listed above.
☐ the application identified above.
☐ the patent identified above.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate statements as to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 C.F.R. §1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d), or a nonprofit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.
☐ each such person, concern or organization is listed below.

NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 C.F.R. §1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 C.F.R. §1.28(b))

NAME OF PERSON SIGNING: CONTAL Alain
TITLE OF PERSON IF OTHER THAN OWNER: Development Director
ADDRESS OF PERSON SIGNING: 20 rue Rouget de Lisle
F-92130 Issy les Moulineaux, France

SIGNATURE [Signature]

DATE 29/06/2001

09/889994
JC17 Rec'd PCT/PTO 25 JUL 2001

EXPRESS MAIL NO.: ET069433553US

PATENT
pvmt1.d01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of :
CERVENY, Jean-Paul :
International Application :
No. PCT/FR99/03265 :
International Filing :
Date: 23 December 1999 :
For a Patent for a :
MODULAR MACHINE FOR STERILIZING CLOSURE :
PARTS OF BOTTLES WITH SPIRAL PATH : 25 July 2001

PRELIMINARY AMENDMENT

Box PCT
Commissioner for Patents
Washington, D.C. 20231

Sir:

This Preliminary Amendment accompanies a Transmittal Letter entering the above-identified PCT application into its national phase for the United States. Prior to examination, please amend the claims as follows.

IN THE CLAIMS

Please amend the following claims:

3. (Amended) The machine as claimed in claim 1, characterized in that the parts are set in motion in their path by friction against a rotating member.

7. (Amended) The machine as claimed in claim 5, characterized in that the sterilizing liquid is collected in the lower part of the stationary drum (8), in a suction cavity (17) which is offset with respect to the vertical plane of symmetry of the drum, the liquid being offset by the rotating of the rotary drum (6).

8. (Amended) The machine as claimed in claim 5, characterized in that arrangements are made to prevent the liquid from running over the ends of the drum.

9. (Amended) The machine as claimed in claim 5, characterized in that, having been sucked up through a pipe (18), the sterilizing liquid is filtered in filtration means (22) then reheated by heating means (23), then recycled.

10. (Amended) The machine as claimed in claim 1, characterized in that transitions between the sections are provided by arrangements of the spiral slideway.

11. (Amended) The machine as claimed in claim 2, characterized in that the sterilizing solution is injected by a nozzle (15) into a pressure-equalizing chamber (26) formed by a wall (27) parallel to that of the stationary drum.

12. (Amended) The machine as claimed in claim 3, characterized in that a groove (28) in which the central cap of the parts slides is provided on the interior face of the rotary drum (6).

13. (Amended) The machine as claimed in claim 1, characterized in that the stoppering parts are set in motion by a driving fluid.

18. (Amended) The machine as claimed in claim 13,

characterized in that it is made of modules of identical design assembled in series and closed at both ends.

19. (Amended) The machine as claimed in claim 13, characterized in that a hopper (120, 120') for collecting rejections is provided at the outlet of each module.

20. (Amended) The machine as claimed in claim 13, characterized in that at least one slit (116) is provided at the outlet of each module and on its sleeve, to encourage the driving fluid to be sucked up into an annular manifold (115).

21. (Amended) The machine as claimed in claim 13, characterized in that the liquid is recycled into the inlet tube.

22. (Amended) The machine as claimed in claim 1, characterized in that its longitudinal axis is arranged vertically for vertical operation.

23. (Amended) The machine as claimed in claim 1, characterized in that its longitudinal axis is arranged horizontally for horizontal operation.

24. (Amended) The machine as claimed in claim 13, characterized in that it comprises a standard module with several turns, the upper part of the last turn of which carries out the function of rinsing with air, the previous turns or front turns performing the sterilizing function.

26. (Amended) The machine as claimed in claim 25, characterized in that one of the orifices (220c) is provided in the bottom part of each turn on the vertical plane of symmetry (221).

27. (Amended) The machine as claimed in claim 24, characterized in that a cylinder (222a) coaxial with the cylindrical sleeve (217) delimits a cylindrical discharge space (222).

REMARKS

Prior to examination, entry of the foregoing amendments is respectfully requested in accordance with the provisions of 37 C.F.R. §1.115. The claims have been amended to delete multiple dependencies to bring the claims into closer compliance with 37 C.F.R. §1.75(c). Marked up versions of the rewritten claims are enclosed with this Preliminary Amendment, on a separate page, in accordance with the provisions of 37 C.F.R. §§1.121(c). An early and favorable consideration of the present application, as amended, is respectfully requested.

Respectfully submitted,



COHEN, GARY M., ESQ.
Reg. No. 28,834
Attorney for Applicant

MARKED UP VERSIONS OF REWRITTEN CLAIMS

3. (Amended) The machine as claimed in claim 1 [one of claims 1 and 2], characterized in that the parts are set in motion in their path by friction against a rotating member.

7. (Amended) The machine as claimed in claim 5 [one of claims 5 and 6], characterized in that the sterilizing liquid is collected in the lower part of the stationary drum (8), in a suction cavity (17) which is offset with respect to the vertical plane of symmetry of the drum, the liquid being offset by the rotating of the rotary drum (6).

8. (Amended) The machine as claimed in claim 5 [one of claims 5 to 7], characterized in that arrangements are made to prevent the liquid from running over the ends of the drum.

9. (Amended) The machine as claimed in claim 5 [one of claims 5 to 8], characterized in that, having been sucked up through a pipe (18), the sterilizing liquid is filtered in filtration means (22) then reheated by heating means (23), then recycled.

10. (Amended) The machine as claimed in claim 1 [one of claims 1 to 10], characterized in that transitions between the sections are provided by arrangements of the spiral slideway.

11. (Amended) The machine as claimed in claim 2 [one of claims 2 to 10], characterized in that the sterilizing solution is injected by a nozzle (15) into a pressure-equalizing chamber (26) formed by a wall (27) parallel to that of the stationary drum.

12. (Amended) The machine as claimed in claim 3 [one of claims 3 to 11], characterized in that a groove (28) in which the central cap of the parts slides is provided on the interior face of the rotary drum (6).

13. (Amended) The machine as claimed in claim 1 [one of claims 1 and 2], characterized in that the stoppering parts are set in motion by a driving fluid.

18. (Amended) The machine as claimed in claim 13 [one of claims 13 to 17], characterized in that it is made of modules of identical design assembled in series and closed at both ends.

19. (Amended) The machine as claimed in claim 13 [one of claims 13 to 18], characterized in that a hopper (120, 120') for collecting rejections is provided at the outlet of each module.

20. (Amended) The machine as claimed in claim 13 [one of claims 13 to 19], characterized in that at least one slit (116) is provided at the outlet of each module and on its sleeve, to encourage the driving fluid to be sucked up into an annular manifold (115).

21. (Amended) The machine as claimed in claim 13 [one of claims 13 to 20], characterized in that the liquid is recycled into the inlet tube.

22. (Amended) The machine as claimed in claim 1 [one of claims 1 to 21], characterized in that its longitudinal axis is arranged vertically for vertical operation.

23. (Amended) The machine as claimed in claim 1 [one of claims 1 to 21], characterized in that its longitudinal axis is arranged horizontally for horizontal operation.

24. (Amended) The machine as claimed in claim 13 [one of claims 13 to 17], characterized in that it comprises a standard module with several turns, the upper part of the last turn of which carries out the function of rinsing with air, the previous turns or front turns performing the sterilizing function.

26. (Amended) The machine as claimed in claim 25 [the preceding claim], characterized in that one of the orifices (220c) is provided in the bottom part of each turn on the vertical plane of symmetry (221).

27. (Amended) The machine as claimed in claim 24 [one of claims 24 to 26], characterized in that a cylinder (222a) coaxial with the cylindrical sleeve (217) delimits a cylindrical discharge space (222).

Modular machine for sterilizing closure parts
of bottles with spiral path

5 The present invention relates to a device for sterilizing plastic and/or metal parts intended for stoppering bottles.

10 The applicant has set itself the objective of producing a device which is less expensive than those currently used while at the same time considerably extending the sterilization time duration. Another objective is to produce a plant that can be modified at will.

15 According to the invention, these objectives are achieved by virtue of a machine for sterilizing plastic and/or metal stoppering parts for bottles, the machine being installed on a bottling line, upstream of the screwing machine and operating at the same rate
20 whereas, the stoppering parts being introduced unsterilized into an inlet at one end of the machine and emerging sterilized through an outlet at the other end of the machine, characterized in that the path followed by the parts between the inlet and the outlet of the machine and within it is a spiral path.

25 The stoppering parts are set in motion by friction against a rotating member or by a driving fluid.

30 A machine according to the invention carries out at least the functions of sterilizing and rinsing; depending on the alternative form chosen, it also carries out pre-drying or drying.

35 According to two first alternative forms of embodiment, a machine according to the invention comprises three successive and coaxial sections: sterilizing, rinsing and drying, these having the same axis as the spiral of

the path and having the preferred and possible characteristics below.

As a preference, the parts are set in motion in their
5 path by friction against a rotating member.

More particularly, the parts are set in motion by a conveying system formed of a hollow cylindrical sleeve which can move in rotation around a spiral slideway
10 secured to a stationary drum and wound around the exterior wall thereof, the slideway having a profile in the shape of a U open toward the sleeve and a height shorter than that of the stoppering parts so that the friction between the rotary drum and the stoppering
15 parts introduced into the slideway causes said parts to move along.

As a preference, in the sterilizing section, the bottom of the spiral screw comprises a great many holes
20 through which a great many nozzles, situated inside the stationary drum and preferably in its upper part, inject a sterilizing solution.

As a preference, the holes are directed in a direction
25 which is inclined with respect to a radius of the drum.

As a preference, the sterilizing liquid is collected in the lower part of the stationary drum, in a suction cavity which is offset with respect to the vertical
30 plane of symmetry of the drum, the liquid being offset by the rotating of the rotary drum.

As a preference, arrangements are made to prevent the liquid from running over the ends of the drum.
35

As a preference, having been sucked up through a pipe, the sterilizing liquid is filtered in filtration means then reheated by heating means, then recycled.

As a preference, transitions between the sections are provided by arrangements of the spiral slideway.

5 As a preference, the sterilizing solution is injected by a nozzle into a pressure-equalizing chamber formed by a wall parallel to that of the stationary drum.

10 As a preference, a groove in which the central cap of the parts slides is provided on the interior face of the rotary drum.

According to two other alternative forms of embodiment of a machine according to the invention, the stoppering parts are set in motion by a driving fluid.

15 As a preference, the driving fluid is chosen from the (compressed air, pulsed filtered air, sterilizing liquid) set.

20 As a preference, the parts travel in a conveying system formed of a hollow and stationary cylindrical sleeve surrounding a spiral slideway secured to a stationary drum and wound on the exterior wall thereof, the sole of the slideway having openings for injecting the driving fluid.

25 As a preference, the slideway is made by a profiled separation positioned and welded into a spiral groove made on the stationary drum.

30 As a preference, the sole is a flexible metal strip wound between the separations and held by tension at its ends, and resting on two shoulders of the separation.

35 As a preference, the machine is made of modules of identical design assembled in series and closed at both ends.

As a preference, at least one slit is provided at the outlet of each module and on its sleeve, to encourage the driving fluid to be sucked up into an annular manifold.

5

As a preference, the liquid is recycled into the inlet tube.

10

Depending on the need, the longitudinal axis of the machine is arranged vertically for vertical operation or is arranged horizontally for horizontal operation.

15

According to one of the alternative forms, the machine comprises a standard module with several turns, the upper part of the last turn of which carries out the function of rinsing with air, the previous turns or front turns performing the sterilizing function.

20

As a preference, orifices for the passage of liquid-injection nozzles oriented at a driving angle are provided in the sole of each front turn.

25

As a preference, one of the orifices is provided in the bottom part of each turn on the vertical plane of symmetry.

30

As a preference, a cylinder coaxial with the cylindrical sleeve delimits a cylindrical discharge space.

35

As a preference, an air inlet inside the module distributes air to at least one air-injection nozzle for driving the stoppering parts, then to at least one second air-injection nozzle which performs internal rinsing of the stoppering parts, then to at least one

third air-injection nozzle which performs external rinsing of the stoppering parts.

Of course, the preferred but non-limiting characteristics listed may be applied individually or in combination.

The invention will be better understood with the aid of the description which follows, given with reference to the following appended figures:

- Figure 1: a sketch showing, in side view, a first embodiment of the invention,
- Figure 2: a sketch showing the stationary drum and the slideway for conveying,
- Figure 3: a sketch showing the conveying assembly in vertical section taken in the sterilizing section,
- Figure 4: the detail of the conveying assembly in its upper part,
- Figure 5: the detail of the conveying assembly in its lower part,
- Figure 6: a sketch showing, in side view, a second embodiment of the invention,
- Figure 7: a sketch showing the stationary drum and the slideway for conveying in the embodiment of figure 6,
- Figure 8: a sketch showing the conveying assembly in vertical section taken in the sterilizing section,
- Figure 9: the detail of the conveying assembly in its upper part,
- Figure 10: the detail of the conveying assembly in its lower part,
- Figure 11, a view in section on BB of figure 9,
- Figures 12 to 18: sketches showing alternative forms of arrangement of the rotary drum (6),
- Figures 19a, 19b: sketches showing the design of the transitions between sections,

- Figures 20a, 20b: details of the conveying assembly in the case of "sports stoppers",
- Figure 21: a sketch showing, viewed in section, a third embodiment of the invention,
- 5 - Figures 22, 22a, 22b: detail views of the embodiment of figure 2,
- Figure 23: steps in a method according to the invention,
- Figures 24 and 25: skeleton diagrams of a standard module according to a fourth embodiment of the invention,
- 10 - Figure 26: a schematic general arrangement of a sterilizing plant comprising a device according to figures 24 and 25,
- 15 - Figure 27: a front view of the plant of figure 26,
- Figure 28: a detail view of a sterilizing liquid injection nozzle,
- Figure 29: a view in vertical section of one of the front turns of a standard sterilizing-rinsing module,
- 20 - Figure 30: a horizontal part section on AA of figure 29,
- Figure 31: a view in vertical and transverse section of the upper part of the last turn of a standard sterilizing-rinsing module.
- 25

Reference is made first of all to figures 1 to 5 which correspond to a first embodiment of the invention.

30 A sterilizing device (1) according to the invention is installed on the bottling line, upstream of the screwing machine, and operates at the same rate thereas.

35 Such a device essentially comprises three successive sections along the same axis: a sterilizing section (2), a rinsing section (3) and a drying zone (4).

In figures 1 to 5 which depict a first non-limiting embodiment of the invention operating horizontally, the invention is made up mainly of a conveying assembly (5) formed of a hollow cylindrical sleeve (6) which can move in rotation around a spiral slideway (7) secured to a stationary drum (8) and wound around the exterior wall thereof. The slideway (7) has a profile in the shape of a U open toward the sleeve.

10 The sleeve or rotary drum (6) and the stationary drum (8) are coaxial.

The spiral slideway (7) is extended at one end of the stationary drum (8) by an inclined straight part forming an inlet slideway (9) in which all the unsterilized stoppering parts (11) are oriented in the same direction and drop down toward the bottom to enter the conveying assembly.

20 The spiral slideway is extended at its other end by a straight part, also inclined, forming an outlet slideway (10) so as to direct downward the stoppering parts (11) all oriented in the same direction as in the inlet slideway (9).

25 The slideway (7) is appreciably shorter in height (see figures 9, 11) than the stoppering parts so as to let them protrude. The friction between the rotary drum (6) and the stoppering parts (11) causes the latter to move in the spiral slideway (7), driving them toward the exit slideway (10).

30 The interior surface of the rotary drum (6) may, for example, be smooth or striated with grooves parallel to the axis of rotation, or striated with grooves in a spiral parallel to the axis (12) of the stationary spiral slideway (7) (see figure 12).

Thanks to this internal conveying assembly (5), the path of a stoppering part (11) is considerably lengthened by comparison with the length of the stationary drum.

5

By way of example, a stoppering part (11) covers 35 m for a sleeve length of 1 m.

10 In the sterilizing section (see figures 2 and 4), the bottom (13) of the spiral screw (7) comprises a great many holes (14) through which a great many nozzles (15), situated inside the stationary drum (8) and preferably in its upper part, inject a liquid and/or gaseous and/or hot sterilizing solution.

15

As a preference, the holes (14) are not directed radially but are directed in a direction which is inclined, for example by an angle α = from 10 to 20°, with respect to a radius of the drum. The jets (16) of sterilizing solution thus play a part in moving the stoppering parts (11).

20

As a preference, as in figure 5, the sterilizing liquid is collected at the lower part of the stationary drum (8), in a suction cavity (17) which is offset with respect to the vertical plane of symmetry of the drum, the liquid being offset by the rotating of the rotary drum (6).

25

30 To prevent the liquid from running over the ends of the rotary drum, arrangements are made, a few alternative forms of which are described hereinbelow by way of non-limiting examples:

35

- the rotary drum (6) (figures 13, 14a and 14b) may have rigid circular returns (18) at each end, the height of which exceeds the level (12) of liquid to be held back. In this case, the inlet slideway

(19) will need to be elbowed at (19) to pass around the return (18);

- if the returns (18) are made of elastomer or some other flexible material, a separating finger (21) may be provided in line with the arrival of the inlet slideway (9) (see figure 17);
- the entire rotary drum (6) assembly (figure 15) may be immersed in a tank (20);
- the entire drum assembly may be inclined and one of its ends may be immersed in a tank (20) (figure 16);
- the radius of gyration of the spiral slideway (7) may also be varied in line with the inlet and the outlet of the rotary drum (figure 18).

Having been sucked up by a pipe (18a) (see figure 1), the sterilizing liquid is filtered in filtration means (22) then reheated by heating means (23), then recycled.

The rinsing (3) and drying (4) sections each have a conveying means constructed on the same principle as the one in the sterilizing section.

The transitions between sections may be accomplished by arrangements of the spiral slideway:

- by varying the pitch diameter of the spiral slideway (7) which in this case is a one-piece construction (see sketch at figure 19a);
- by varying the pitch diameter and increasing the pitch (in order not to reduce the radius of gyration), in this case the slideway is visible (see sketch at figure 19b).

The supporting structure and the mechanical drive means (motor (30), rollers (31), etc.) are within the competence of the person skilled in the art.

A second embodiment is given by way of non-limiting example in figures 6 to 11.

5 This one differs from the first embodiment essentially in the form of the support structure (24) and the transition between two sections by increasing the pitch of the spiral slideway.

10 It also comprises inspection hatches (25) which may of course also be provided on the first embodiment.

15 The sterilizing solution is injected by a nozzle (15) into a pressure-equalizing chamber (26) formed by a wall (27) parallel to that of the stationary drum (8) (figure 9).

20 Figure 11 shows, viewed in section on BB of figure 9, stoppering parts in two successive loops of the slideway.

These embodiments may be modified for sterilizing "sports" stoppers which have a central cap (29) projecting from the lid.

25 In this case, (figures 20a and 20b), straight grooves or channels parallel to the axis of rotation (28) and in which the central cap of the parts slides are provided on the interior face of the rotary drum (6).

30 Reference is now made to figures 21 to 23 of a third embodiment of the invention. This is depicted operating vertically, from top to bottom, but the direction of operation could be reversed and provision could also be made for it to be made to operate horizontally in one
35 direction or the other.

In this embodiment, the parts are set in motion by a driving fluid injected into the machine, their path between the inlet E and the outlet S of the machine

remaining a spiral path. The driving fluid is, for example, filtered air injected under pressure or blown in by a fan.

- 5 The stoppering parts travel in a conveying system (5) formed of a hollow and stationary cylindrical sleeve (101) coaxial with a stationary drum (102) forming a support for a conveying spiral slideway (107) arranged in the space between the sleeve (101) and the drum
10 (102).

The hollow cylindrical sleeve (101) surrounds a spiral slideway secured to a stationary drum and wound on the exterior wall thereof, the sole (103) of the slideway
15 having openings for injecting the driving fluid.

By way of a non-limiting example, the figures depict a spiral slideway produced using a profiled separation (107a) positioned and welded into a spiral groove made
20 on the exterior surface of the stationary drum (102) (figure 22a).

The bottom of the slideway, known as the sliding sole (103), is made in the form of a flexible metal strip wound in a spiral between the separations (107a) and
25 held by tension at its two ends, its two edges resting on two shoulders (107b) provided on each side of the separation (107a) (figure 22a).

- 30 As a preference, the plant is modular as in figures 21 and 22, that is to say that the sterilizing (108), rinsing (109) and drying (110) sections are modules of identical design assembled in series by fastening means (104) and closed at both ends by an inlet wall and by
35 an outlet wall (111, 112).

Use is preferably made of a single sliding sole for all of the modules.

These modules differ according to their function in terms of the fluid conveyed therein.

Depending on whether a module is used as a sterilizing section, a washing section or a drying section, tubes (106 or 106') internal to the drum (102) and parallel to its longitudinal axis bring in sterilizing fluid or driving fluid (for example liquid through the tube (106) and sterile air through the tube (106')).

The fluid is, for example, injected into the pressure chamber (105) by nozzles (114) the delivery of which can be adjusted by virtue of adjusting means (114b) and which pass through the drum (102) via rectangular slits (114a). From one to four nozzles per turn may be provided (figures 21, 22, 22a and 22b).

The fluid then passes through the sliding sole through openings (113) (the geometry of which is, for example, triangular (113a) or trapezoidal (113b) and known from the prior art) which direct the jet of fluid in the direction of travel of the stopping parts (figure 22a).

One (or more) suction slits (116) (figure 22a), preferably inclined (for example at 45°), is or are provided at the outlet end of each module and on its stationary sleeve (101) to encourage the driving fluid to be sucked up into an annular manifold (115a) (figures 22a and 21) by virtue of a suction means (117). This fluid will then go off to be recycled in a fluid/air separator (119) (figure 21).

A hopper (120, 120') for collecting parasitic rejections of fluids inside the drums is provided at the outlet of each module (figure 21). These rejections are carried by concentric tubes (121, 121') as far as a filter (122) which also collects the fluid leaving a tube (123) of the separator (119) (figure 21).

The fluid from the filter (122) is pumped by a recycling pump (124), taken to a reservoir (125) then recycled by an inlet pump (126) into the inlet tube (106).

5

A modular plant has many advantages.

In particular, it allows an existing plant to be modified (for example by adding modules if the sterilizing is insufficient), or makes it possible, using standard elements, to produce plant tailored to local means, or allows a process to be modified.

Figure 23 depicts, by way of a non-limiting example, the steps which may make up a sterilizing method according to the invention; these are:

- E: inlet of stoppering parts
- A: injection of sterilizing liquid, liquid phase
- 20 B: injection of driving fluid
- C: outlet of sterilizing liquid
- D: injection of pure water
- H: injection of driving fluid
- F: outlet of water
- 25 G: drying with air
- I: outlet of air
- F: outlet of stoppering parts.

Reference is now made to figures 24 to 30 of a fourth embodiment of the invention.

Figure 26 diagrammatically shows the installation of a sterilizing-rinsing device (201) according to the invention in a sterilizing plant (202) situated upstream of a bottling line (203).

In the plant (202), the stoppering parts (213) from a magazine (204) which orients them and distributes them, are conveyed by an inlet slideway (214) to a

sterilizing-rinsing device (201) in which they travel in a spiral path (215) under the effect of a driving fluid, then leave via an outlet slideway (216) fitted with a regulator (205) determining the outlet speed of the stoppering parts (213) according to the rate needed for the bottling line (203), the casing of a charging machine (203a) and of a screwing machine (203b) of which can be glimpsed.

Figures 26 and 27 depict only the main components of the sterilizing liquid circuit: reservoir (206), pump (207), filters (208), the inlet (209) of liquid into the device (201) splitting into a number of injection pipes (210), for example three, each supplying a liquid-injection nozzle (211a, 211b, 211c).

Of the compressed air circuit, only the locations of the air injection nozzles (212a, 212b) have been depicted.

A sterilizing-rinsing device (201) according to this fourth embodiment is manufactured in the form of a standard module that meets predetermined standard sterilization criteria, said standard module being depicted schematically in figures 24 and 26.

The spiral path comprises, for example, although this is not limiting, six contiguous turns, the upper part of the last turn (or rear turn) of which carries out the function of rinsing with air, the previous turns (or front turns) performing the sterilizing function using a sterilizing liquid injected through a number of liquid-injection nozzles, of which there are for example three (211a, 211b, 211c) per turn.

The U-shaped slideway which forms the spiral path (215) may be produced according to the techniques already described for the third embodiment.

As in the previous embodiment, the stoppering parts are conveyed through the standard module (201) between a stationary cylindrical sleeve (217) forming the outer envelope, a stationary sole (or bottom) (218) of the
5 slideway, and two separating walls (219).

Within this path, the stoppering parts are set in motion by the sterilizing liquid under pressure which also acts as a driving fluid.

10 For this, the nozzles are distributed uniformly over each turn and oriented at a driving angle (β) as shown by figure 29 which corresponds to a detail view of one of the front turns.

15 The driving angle (β) is preferably measured tangentially to the sole of the turns.

20 Orifices (220a, 220b, 220c) are provided in the sole of the turns for the passage of the nozzles (211a, 211b, 211c).

25 As a preference, one of the orifices (220c) is provided in the bottom part of each turn, on the vertical and longitudinal plane (221) of the module.

30 A cylinder (222a) coaxial with the cylindrical stationary sleeve (217) delimits, with the collection of the bottoms of the turns (218), a cylindrical discharge space (222).

35 Excess sterilizing liquid is discharged through the two upper orifices (220a, 220b) of each turn, flows into the cylindrical space (222), passes through the bottom orifices (220c) of the front turns, then the discharge holes (223) provided in the bottom of the outer cylindrical sleeve (217) to then be collected in a discharge tank (225).

The discharge holes (223) (see figure 30) are preferably oblong in shape, their longitudinal axis being placed at right angles to the vertical longitudinal plane (221) of the module and on the axes of the separations (219) so that the liquid is discharged through the more or less triangular gaps (224) which lie on each side of the separations (219) of the slideway between the stoppering parts (213).

Reference is now made to figure 31 which shows the rinsing with air performed more or less in half or one third of the upper part of the last turn.

An inlet of pressurized air (223), situated inside the module (201), distributes air under pressure to a first (or several) air-injection nozzle(s) (212a) directing the air in the direction in which the stoppering parts (213) move so as to take over, by way of driving fluid, from the sterilizing liquid which performs this function in the bottom part of the turn and which has been discharged.

The air inlet (223) also distributes air to a second (or several) air-injection nozzle(s) (212b) situated toward the top of the last turn and directing air toward the inside of the stoppering parts which travel past it so as to rinse their insides, one after the other.

The outsides of the stoppering parts (213) are rinsed by one or more nozzles (212c) situated externally to the cylindrical sleeve (217).

In the upper part of the last turn performing rinsing, the stoppering parts are driven by the air, then rinsed on the inside and on the outside (or vice versa) to arrive already partly dried in the outlet slideway which directs them toward a dryer (not depicted) which will complete the drying thereof.

In order to regulate the exit speed of the stoppering parts (213), the regulator (205) may, for example, be made up of a star-shaped rotary component (226) driven by a geared motor (227).

CLAIMS

1. A machine for sterilizing plastic and/or metal stoppering parts for bottles, the machine being installed on a bottling line, upstream of the screwing machine and operating at the same rate thereas, the stoppering parts being introduced unsterilized into an inlet at one end of the machine and emerging sterilized through an outlet at the other end of the machine, characterized in that the path followed by the parts between the inlet and the outlet of the machine and within it is a spiral path.
2. The machine as claimed in claim 1, characterized in that it comprises three successive and coaxial sections: sterilizing (2), rinsing (3) and drying (4), these having the same axis as the spiral of the path.
3. The machine as claimed in one of claims 1 and 2, characterized in that the parts are set in motion in their path by friction against a rotating member.
4. The machine as claimed in claim 3, characterized in that the parts are set in motion by a conveying system (5) formed of a hollow cylindrical sleeve which can move in rotation around a spiral slideway (7) secured to a stationary drum (8) and wound around the exterior wall thereof, the slideway having a profile in the shape of a U open toward the sleeve and a height shorter than that of the stoppering parts so that the friction between the rotary drum (6) and the stoppering parts introduced into the slideway causes said parts to move along.

5. The machine as claimed in claim 4, characterized in that, in the sterilizing section, the bottom (13) of the spiral screw (7) comprises a great many holes (14) through which a great many nozzles (15), situated inside the stationary drum (8) and preferably in its upper part, inject a sterilizing solution.
6. The machine as claimed in claim 5, characterized in that the holes (14) are directed in a direction which is inclined with respect to a radius of the drum.
7. The machine as claimed in one of claims 5 and 6, characterized in that the sterilizing liquid is collected in the lower part of the stationary drum (8), in a suction cavity (17) which is offset with respect to the vertical plane of symmetry of the drum, the liquid being offset by the rotating of the rotary drum (6).
8. The machine as claimed in one of claims 5 to 7, characterized in that arrangements are made to prevent the liquid from running over the ends of the drum.
9. The machine as claimed in one of claims 5 to 8, characterized in that, having been sucked up through a pipe (18), the sterilizing liquid is filtered in filtration means (22) then reheated by heating means (23), then recycled.
10. The machine as claimed in one of claims 1 to 10, characterized in that transitions between the sections are provided by arrangements of the spiral slideway.
11. The machine as claimed in one of claims 2 to 10, characterized in that the sterilizing solution is

injected by a nozzle (15) into a pressure-equalizing chamber (26) formed by a wall (27) parallel to that of the stationary drum.

- 5 12. The machine as claimed in one of claims 3 to 11, characterized in that a groove (28) in which the central cap of the parts slides is provided on the interior face of the rotary drum (6).
- 10 13. The machine as claimed in one of claims 1 and 2, characterized in that the stoppering parts are set in motion by a driving fluid.
- 15 14. The machine as claimed in claim 13, characterized in that the driving fluid is chosen from the (compressed air, pulsed filtered air, sterilizing liquid) set.
- 20 15. The machine as claimed in claim 14, characterized in that the parts travel in a conveying system (5) formed of a hollow and stationary cylindrical sleeve (101, 217) surrounding a spiral slideway secured to a stationary drum and wound on the exterior wall thereof, the sole (103, 218) of the
- 25 slideway having openings for injecting the driving fluid.
- 30 16. The machine as claimed in claim 15, characterized in that the slideway is made by a profiled separation (107a, 219) positioned and welded into a spiral groove made on the stationary drum (102).
- 35 17. The machine as claimed in claim 16, characterized in that the sole (103, 218) is a flexible metal strip wound between the separations (107a, 219) and held by tension at its ends, and resting on two shoulders (107b) of the separation.

18. The machine as claimed in one of claims 13 to 17, characterized in that it is made of modules of identical design assembled in series and closed at both ends.

19. The machine as claimed in one of claims 13 to 18, characterized in that a hopper (120, 120') for collecting rejections is provided at the outlet of each module.

20. The machine as claimed in one of claims 13 to 19, characterized in that at least one slit (116) is provided at the outlet of each module and on its sleeve, to encourage the driving fluid to be sucked up into an annular manifold (115).

21. The machine as claimed in one of claims 13 to 20, characterized in that the liquid is recycled into the inlet tube.

22. The machine as claimed in one of claims 1 to 21, characterized in that its longitudinal axis is arranged vertically for vertical operation.

23. The machine as claimed in one of claims 1 to 21, characterized in that its longitudinal axis is arranged horizontally for horizontal operation.

24. The machine as claimed in one of claims 13 to 17, characterized in that it comprises a standard module with several turns, the upper part of the last turn of which carries out the function of rinsing with air, the previous turns or front turns performing the sterilizing function.

25. The machine as claimed in claim 24, characterized in that orifices (220a, 220b, 220c) for the passage of liquid-injection nozzles (211a, 211b,

211c) oriented at a driving angle (β) are provided in the sole of each front turn.

5 26. The machine as claimed in the preceding claim, characterized in that one of the orifices (220c) is provided in the bottom part of each turn on the vertical plane of symmetry (221).

10 27. The machine as claimed in one of claims 24 to 26, characterized in that a cylinder (222a) coaxial with the cylindrical sleeve (217) delimits a cylindrical discharge space (222).

15 28. The machine as claimed in claim 27, characterized in that the cylindrical sleeve (217) has oblong-shaped discharge holes (223).

20 29. The machine as claimed in claim 24, characterized in that an air inlet (223) inside the module (201) distributes air to at least one air-injection nozzle (212a) for driving the stoppering parts, then to at least one second air-injection nozzle (212b) which performs internal rinsing of the stoppering parts, then to at least one third air-injection nozzle (212c) which performs external rinsing of the stoppering parts.

25

ABSTRACT

The invention concerns a machine for sterilizing plastic and/or metal parts for closing bottles, installed on a bottling line, upstream of the screwing machine and operating at the same rate as the latter, the closure parts being inserted non-sterile in an input at one end of the machine and coming out sterilized through an output at the other end of the machine. The invention is characterized in that the travel path of the parts between the machine input and the output and therein, is a spiral travel path. In one embodiment, the pieces are driven in their travel by friction against a rotating member, or by the effect of a driving fluid. The invention is useful for bottling process.

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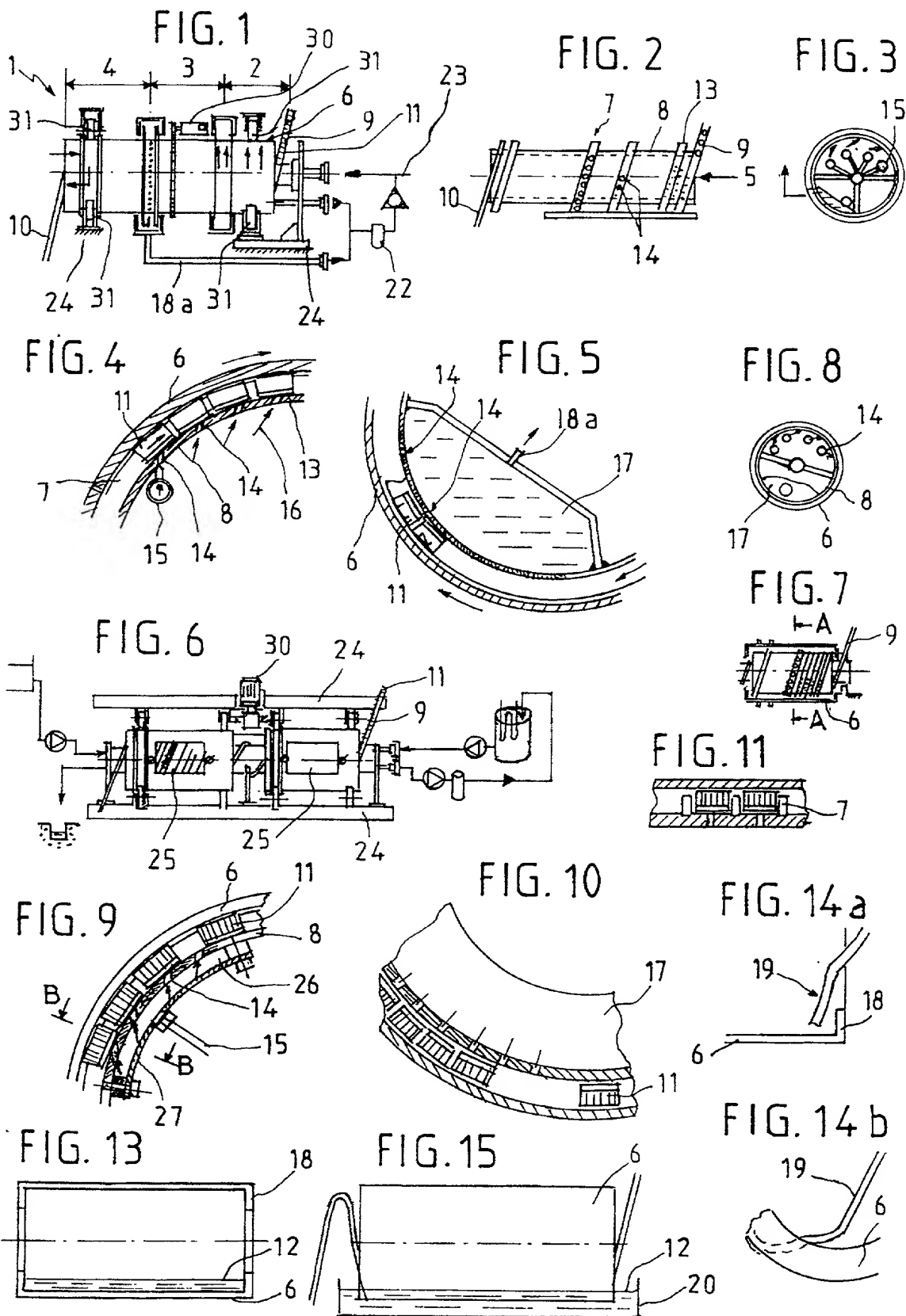


FIG. 12

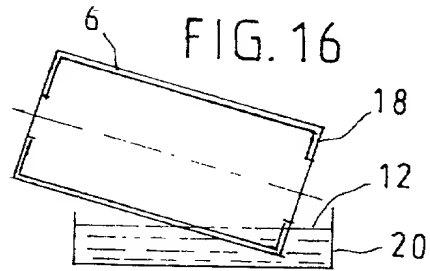
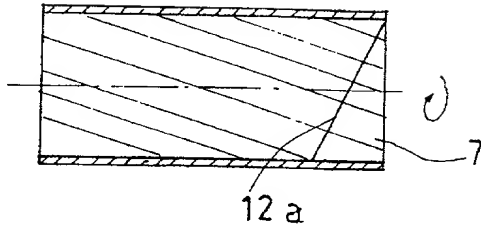


FIG. 19a

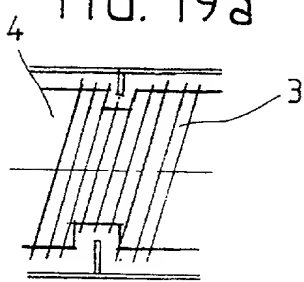


FIG. 18

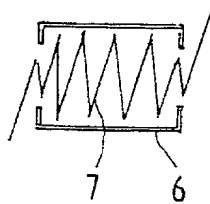


FIG. 17

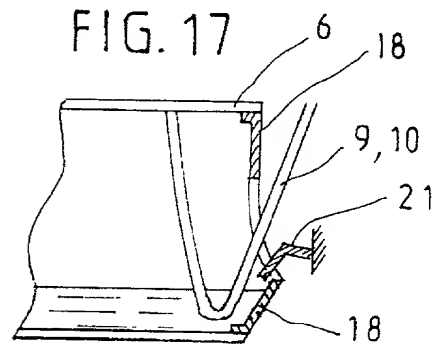


FIG. 19b

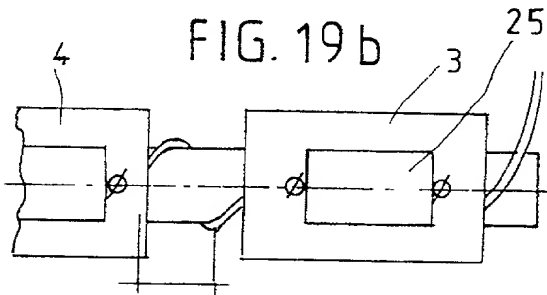


FIG. 22a

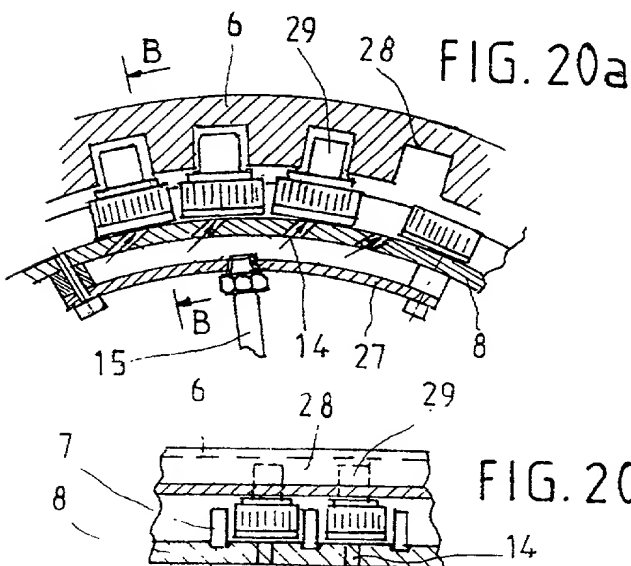
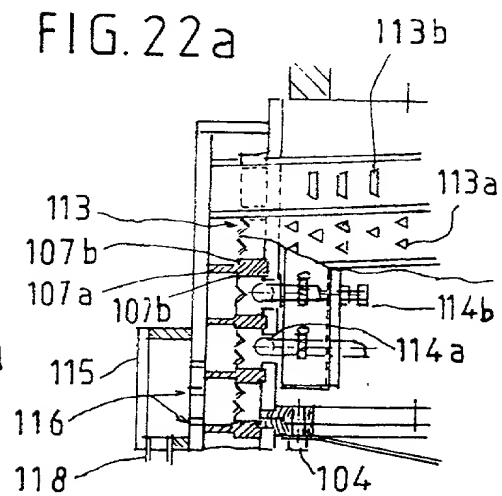


FIG. 22b

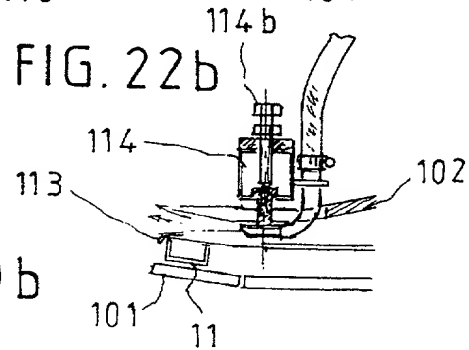
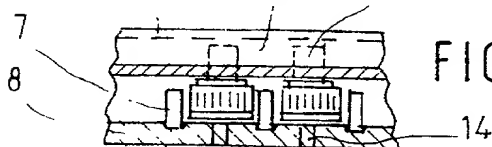


FIG. 20b



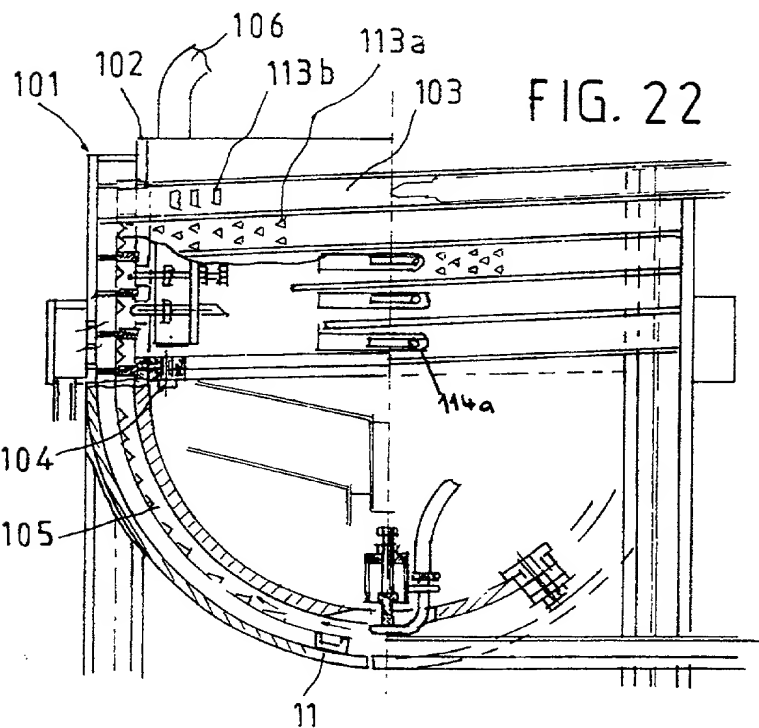


FIG. 22

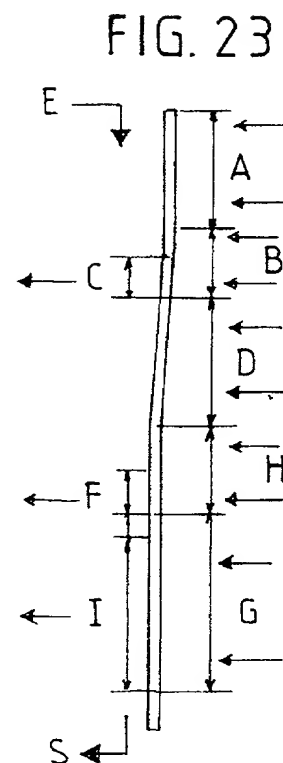


FIG. 23

FIG. 24

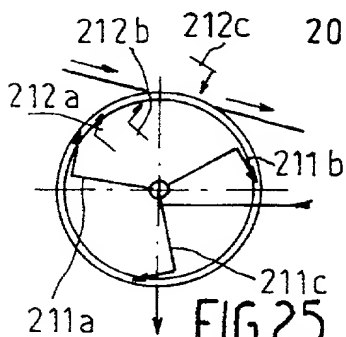
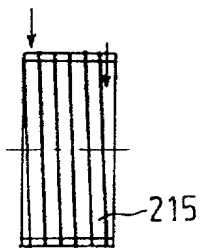


FIG. 26

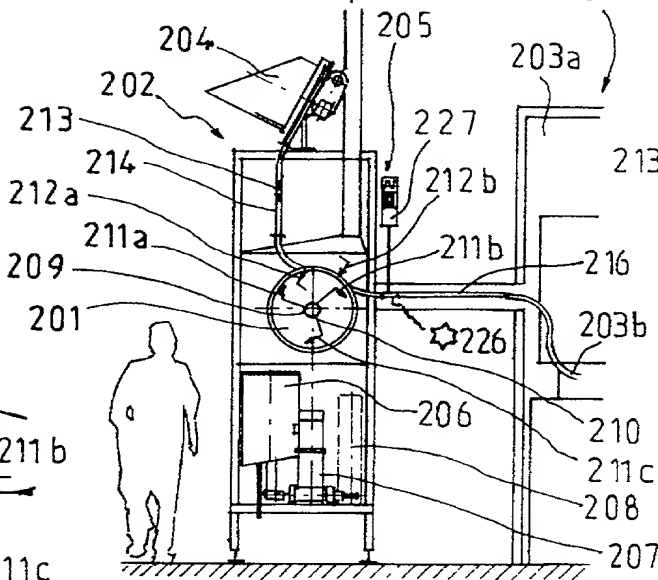


FIG. 27

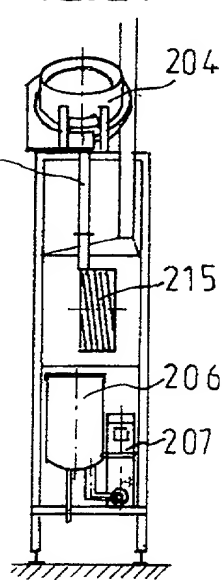
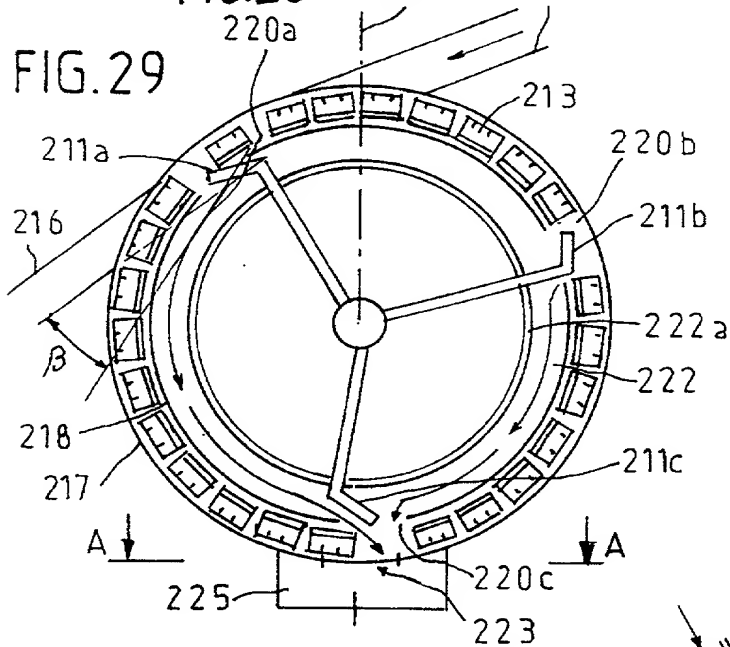


FIG. 29



COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes Reference to PCT International Applications)

Attorney's Reference: PVMT1

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: MODULAR MACHINE FOR STERILIZING CLOSURE PARTS OF BOTTLES WITH SPIRAL PATH, the specification of which (check only one item below):

☐ is attached hereto.

☐ was filed as United States Patent

Application No. _____

on _____

and was amended

on _____ (if applicable).

☒ was filed as PCT International Application

Number PCT/FR99/03265

on 23 December 1999

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 35 U.S.C. 365(b) of any foreign application(s) for patent or inventor's certificate, or under 35 U.S.C. 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
France	99/01332	2 February 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
France	99/14085	5 November 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or under 35 U.S.C. 365(c) of any PCT international application designating the United States of America, that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. §120:

U.S. APPLICATIONS		STATUS (Check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

PCT APPLICATIONS DESIGNATING THE U.S.			STATUS (Check one)		
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)	PATENTED	PENDING	ABANDONED
PCT/FR99/03265	23 December 1999			X	

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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Residence & Citizenship	City	State or Foreign Country	Country of Citizenship
Post Office Address	Post Office Address	City	State/Zip Code/Country

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor 1	Signature of Inventor 2
Date	Date
26 JUNE 2001	